REMARKS

The paragraph numbering used herein is in accordance with the USPTO publication of the application, Publication No. 2004/0216193. In the Specification, paragraphs [0001] and [0005] have been amended to correct minor editorial problems and to delete reference to the embedded hyperlink as required by MPEP §608.01.

Claims 1, 13, and 29 are amended and claims 11-12, 19-28, and 37-38 are cancelled herein. Claims 1-10, 13-20, and 29-36 are pending for the Examiner's review and consideration. The amendments to the claims are fully supported by the original specification and claims. Specifically, the amendment to claims 1, 13, and 29 are supported at paragraphs [0013], [0100], [0104], [0112], [0117] and [0129] for example. See also, priority document column 5, lines 60-67 and Example 7 of U.S. Patent No. 6,750,376, which issued from the parent application, U.S. Application No. 09/576,623, filed May 23, 2000. No new matter has been added by the amendments made herein. Entry of the amendments at this time is therefore respectfully requested.

In view of the examiner's earlier restriction requirement, Applicant retains the right to present claims 21-28 in a divisional application.

The Declaration was objected by the Examiner. Applicant submits a corrected Declaration and request that this rejection be withdrawn.

The specification was objected to because it contained embedded hyperlink and/or other form of browser-executable code on page 2, line 33 and because of informalities in the specification. These errors have been corrected. Applicant therefore respectfully requests that these objections be withdrawn.

Claim Rejections

Claims 1-20 and 29-38 were rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement for the reasons set forth on pages 4-6 of the Office Action. Applicant traverses.

The test for whether a specification has met the written description requirements is whether the specification conveys with reasonable clarity to those skilled in the art that Applicant was in possession of the invention as claimed as of the filing date. See, *e.g., Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). An applicant shows possession of the claimed invention by describing the claimed invention using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the

claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997). A description as filed is presumed to be adequate. See MPEP 2163.04.

Applicant has amended the claims to more specifically recite the steps of the invention. Applicant's presently claimed invention is directed to a method of producing an angiospermous apomictic plant that exhibits an increased genetic stability for apomixis. The method comprises the steps of (1) producing a facultatively apomictic parent plant from sexual plants and (2) increasing the genetic stability of the facultative apomictic parent plant produced. As specified by the amended claims, production of the facultatively apomictic plant from sexual plants is accomplished by:

a) selecting sexual plants from an angiospermous plant species, genus, or family;

b) identifying sexual plants from the selected plants having divergent reproductive schedules of ovule development such that initiation of embryo sac formation in one sexual plant occurs at about the same time as or before meiosis in the other sexual plant relative to the developmental maturity of the nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall;

c) hybridizing the identified sexual plants having divergent reproductive schedules of ovule development;

d) recovering hybrid seed therefrom;

e) sowing the hybrid seed; and

f) selecting a hybrid plant that is apomictic to be the apomictic parent plant.

The step of increasing the genetic stability of the facultative apomictic parent plant produced is accomplished by either doubling the chromosome number of the facultative apomictic plant produced (see claims 1-10); by genetically modifying the apomictic plant produced so that female meiosis is aborted (see claim 13-18); or by alternatively doubling the chromosome number of at least one of the sexual parent plants before hybridizing the identified sexual plants (see claim 29-36).

Applicant's original disclosure teaches and provides examples of the presently claimed invention. For example, in Figures 2-5 and Example 1 of the disclosure, Applicant teaches and describes the step of producing a facultatively apomictic parent plant from sexual plants as claimed. In addition, Applicant fully disclosed and taught this step in the parent

application U.S. Application No. 09/576,623, filed May 23, 2000, which has now issued as U.S. Patent No. 6,750,376 and is expressly incorporated by reference. Specifically, the disclosure sets forth Applicant's method of identifying and hybridizing sexual plants having divergent reproductive schedules of ovule development in order to produce facultatively apomictic plants. The disclosure more specifically teaches that the divergent reproductive schedules of ovule development between the plants should be such that initiation of embryo sac formation in one sexual plant should occur at about the same time as or before meiosis in the other sexual plant relative to the developmental maturity of the nongametophytic ovule and ovary tissues. Applicant further teaches that the nongametophytic ovule and ovary tissue should be selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall.

In Example 5, Applicant provides an example of how to quantify divergence in female development schedule and further in Example 6 Applicant discloses how to obtain greater divergence in female developmental schedules. See also the Examples in the priority application – U.S. Patent No. 6,750,376.

Applicant's disclosure further teaches and provides examples of the step of increasing the genetic stability for apomixis of the facultatively apomictic parent plant produced in the first step. See paragraphs [0089-108] and Example 2. By definition, facultative apomicts produce some of their seed apomictically and some sexually. Apomixis in the synthetically produced facultative apomict of the first step occurs because of duplicate genes for megasporogenesis (female meiosis) and embryo sac, embryo, and endosperm formation. The duplicate genes are expressed in the ovule asynchronously such that embryo sac formation preempts megasporogenesis, resulting in a genetically unreduced (maternal) embryo sac (containing an unreduced egg), and embryo formation preempts fertilization, resulting in a parthenogenically produced embryo in the seed. Stabilizing apomixis refers to modifications made to the facultative apomict of the first step that prevent genetic segregation of the causal genes so that even progeny plants that are produced sexually, from the facultative apomict of the first step, retain their capacity to reproduce apomictically, *i.e.* apomixis is not lost due to genetic segregation. Hence, stabilizing apomixis refers to minimizing the occurrence of sexual revertants (progeny plants that can only reproduce sexually) from the facultatively apomictic parent plant. If the chromosomes containing the duplicate genes responsible for apomixis are homologous (can pair with each other) and are allowed to pair and undergo recombination and independent assortment (Mendel's first and

second laws of genetics), then many sexually produced progeny of a facultative apomict will have lost the alleles that cause apomixis, *i.e.,* the alleles that cause embryo sacs and embryos to form asynchronously.

The specification teaches methods, which are generally simple breeding and plant genetics techniques, that alter the genome of a genetically unstable facultative apomict thus resulting in a new plant in which recombination is eliminated or suppressed thus increasing genetic stability for apomixis, i.e. the ability of the new apomict to produce progeny sexually without those progeny loosing the ability to reproduce apomictically. Applicant provides several methods by which the genetic stability for apomixis can be increased in the facultative apomict. Applicant teaches that this can be done by either making the plant an obligate apomict (preventing sexual reproduction) or by minimizing segregation of the genes causing apomixis (*e.g.,* doubling the chromosome number).

In contrast to the prior art, Applicant first discovered and taught that apomixis is not caused by one or two apomixis genes, but in fact is caused by the asynchronous expression of many duplicate genes regulating meiosis and seed development. Based on this Applicant's discovery, he further discloses that based on this, the genetic stability for apomixis can be increased by doubling the chromosome number (*e.g.,* using spindle inhibitors, tissue culture, B_{III} hybridization, and the like), or by preventing sexual reproduction (*e.g.,* causing sexual sterility by the making of polyploids with odd ploidy levels, or introgressing meiotic mutations, *etc.*). The written description makes reasonably clear and provides examples of how standard methods of plant breeding can be used to double the chromosome numbers or otherwise manipulate ploidy levels of the apomictic parent plant resulting in a new plant that has an increased stability for apomixis compared to the parent plant.

In Example 2, at paragraphs [0114-0118], Applicant provides a working example of successfully increasing the genetic stability for apomixis in a facultative apomict. The synthetic amphiploid of diploid Tripsacum laxum (2x sexual) x T. pilosum (2x sexual) is a stable facultative apomict with 50% diplosporous embryo sac formation (FIG. 8). By hybridizing this plant with T. zopilotense (2x sexual) or T. bravum (2x sexual) a stable obligate apomicts with about 80% diplosporous embryo sac formation and 20% abortive meiocyte or sexual embryo sac formation is produced (FIG. 9).

Finally, Applicant submits a 1.132 declaration providing even further evidence of the effectiveness of the methods disclosed in the present application.

In view of the amendments made herein, the detailed disclosure and the working examples disclosed therein, one skilled in the art would reasonably conclude that the inventor had possession of the claimed invention at the time of filing. Applicant therefore respectfully requests that the rejection for lack of written description be removed.

Claims 1-20 and 29-38 were also rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirements for the reasons set forth on pages 7-13 of the Office Action. Applicant respectfully request reconsideration.

The test of enablement is whether the disclosure coupled with information known in the art provides sufficient information to one reasonably skilled in the art to make or use the invention without undue experimentation." *United States v. Telectronics, Inc.*, 857 F.2d 778, 785, (Fed. Cir. 1988). Reasonable and routine experimentation is not undue experimentation. In fact, even if the experimentation is complex it does not necessarily make it undue, if the art typically engages in such experimentation. *Massachusetts Institute of Technology v. A.B. Fortia*, 774 F.2d 1104 (Fed. Cir. 1985).

There are many factors to be considered when determining whether any necessary experimentation is "undue." These factors include, but are not limited to: (A) the breadth of the claims; (B) the nature of the invention; (C) the state of the prior art; (D) the level of one of ordinary skill; (E) the level of predictability in the art; (F) the amount of direction provided by the inventor; (G) the existence of working examples; and (H) the quantity of experimentation needed to make or use the invention based on the content of the disclosure. *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988) (reversing the PTO's determination that claims directed to methods for detection of hepatitis B surface antigens did not satisfy the enablement requirement).

It is improper to conclude that a disclosure is not enabling based on only one of the above factors. MPEP § 2164.01 (a)

(A) Breadth of the Claims

As explained above, Applicant has amended the claims to more specifically recite the steps of the invention. Claims 11-12, 19-20, and 37-38 are cancelled herein. Applicant's presently claimed method comprises the steps of (1) producing a facultatively apomictic parent plant from sexual plants and (2) increasing the genetic stability of the facultatively apomictic parent plant produced. As specified by the narrowed claims, step 1 is accomplished by:

a) selecting sexual plants from an angiospermous plant species, genus, or family;

b) identifying sexual plants from the selected plants having divergent reproductive schedules of ovule development such that initiation of embryo sac formation in one sexual plant occurs at about the same time as or before meiosis in the other sexual plant relative to the developmental maturity of the nongametophytic ovule and ovary tissues selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall;

c) hybridizing the identified sexual plants having divergent reproductive schedules of ovule development;

d) recovering hybrid seed therefrom;

e) sowing the hybrid seed; and

f) selecting a hybrid plant that is apomictic to be the apomictic parent plant.

According to the claims, Step 2 is accomplished by either doubling the chromosome number of the facultative apomictic plant produced (see claims 1-10); by genetically modifying the apomictic plant produced so that female meiosis is aborted (see claim 13-18); or by alternatively doubling the chromosome number of at least one of the sexual parent plants before hybridizing the identified sexual plants (see claim 29-36).

As can be seen above, the amended claims have been narrowed and are now directed to the hybridization of plants from an angiospermous plant species, genus, or family, not just any hybridization. Further, the hybridization requires specific steps. For example, the claim now requires that the identified sexual plants have divergent reproductive schedules of ovule development, meaning that initiation of embryo sac formation in one sexual plant occurs at about the same time as or before meiosis in the other sexual plant relative to the developmental maturity of the nongametophytic ovule and ovary tissues. The claims further define the nongametophytic ovule and ovary tissues as tissue selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall.

In view of the amendments made herein, the claims have been narrowed and are not overly broad as supported by Applicant's disclosure.

(B) Nature of the Invention

This application relates to making hybrid plants and either doubling the chromosome numbers or preventing sexual reproduction. First, plant breeding is a well

known technology, and techniques used in the art of plant breeding, such as bagging or emasculating of female parents, pollination, identification and selection of apomictic hybrids, and the like, are routine for one skilled in the art. The essential difference between the step of producing the facultative apomictic parent plant as presently claimed and what was previously known in the art is the appropriate selection of parent plants to be used in the hybridization. If the parent plants are correctly identified and selected as taught by Applicant, then the processes of hybridizing the plants and selecting apomictic progeny are all well known to a skilled plant breeder.

Second, the step of increasing the genetic stability of the apomictic parent plant is also accomplished using procedures well known in the art. The Inventor discovered and teaches that apomixis is not caused by one or two apomixis genes as taught by the prior art, but is in fact caused by the asynchronous expression of many duplicate genes regulating meiosis and seed development. One skilled in the art having Applicant's disclosure can now use well known plant breeding procedures to prevent gene segregation. Doubling the chromosome number (*e.g.*, using spindle inhibitors, tissue culture, B_{III} hybridization, and the like) or preventing sexual reproduction (*e.g.*, causing sexual sterility by the making of polyploids with odd ploidy levels, or introgressing meiotic mutations, *etc.*) are all well known in the art.

(C) State of the Prior Art

The field of plant hybridization is well developed and known in the art. Any skilled plant breeder would be able to stabilize apomixis in a facultatively apomictic plant line following the guidelines set out in the present application and using standard plant breeding techniques. Conventional wisdom prior to the filing of the instant specification held that apomixis is caused by an apomixis gene (or two) that was simply inherited. Applicant discovered that this was not correct. Applicant discovered that apomixis is caused by the asynchronous expression of many duplicate genes regulating meiosis and seed development. See present application and the parent application U.S. Application No. 09/576,623, now U.S. Patent No. 6,750,376. Applicant discovered and teaches that in fact well known plant breeding techniques can be used to produce the facultative apomictic plant using Applicant method of identifying and selecting the divergent parent plants as disclosed.

(D) Level of One of Ordinary Skill

The level of skill of a person of ordinary skill in the art is relatively high. A person of ordinary skill in the art as of the filing date of the invention would know how to (1)

select plants for a plant breeding experiment; (2) conduct embryological analyses of plants identifying initiation of embryo sac formation, developmental maturity of the nongametophytic ovule and ovary tissues; (3) hybridize selected sexual plant lines by plant breeding; (4) recover seed from the hybridization, sow and raise plants from the seed; (5) identify facultatively apomictic progeny; (6) chromosome doubling; (7) B_{III} hybridization; and (8) introgressing meiotic mutations. See, for example, Y. Savidan, Genetics and *Utilization of Apomixis for the Improvement of Guineagrass (Panicum maximum Jacq)*, Proc XIV Int. Grassl. Congr., Lexington, KY, 1981, 182 184 (1983); S. Lutts et al., *Male and Female Sporogenesis and Gametogenesis in Apomictic Brachiaria brizantha, Brachiaria decumbes and F1 Hybrids with Sexual Colchicine Induced Tetraploid Brachiaria ruziziensis.* 78 Euphytica 19 25 (1994). J. Torabinejad et al., *Morphology and Genome Analyses of Interspecific Hybrids of Elymus scabrus*, 29 Genome 150-55 (1987). O. Leblanc et al., *Chromosome Doubling in Tripsacum: the Production of Artificial, Sexual Tetraploid Plants*, 114 Plant Breed. 226-30 (1995); Cohen & Yao, *In Vitro Chromosome Doubling of Nine Zantedeschia Cultivars*, 47 Plant Cell Tiss. Org. Cult. 43-49 (1996); Chalak & Legave, *Oryzalin Combined with Adventitious Regeneration for an Efficient Chromosome Doubling of Trihaploid Kiwifruit*, 16 Plant Cell Rep. 97-100 (1996)."

The level of skill in the art is high as evident by the teachings of the prior art listed above.

(E) Level of Predictability in the Art

The amount of guidance or direction needed to enable the invention is inversely related to the amount of knowledge in the state of the art, as well as the predictability of the art. In other words, the more that is known in the prior art about the nature of the invention, how to make and how to use the invention, and the more predictable the art is, the less information needs to be explicitly stated in the specification.

A variety of methods are well know in the art that clearly differentiate sexually-derived progeny of a facultative apomict (a plant that produces seed both sexually and apomictically) from apomictically-derived progeny from the same facultative apomict. The most reliable methods involve dominant morphological or codominant molecular markers, and powerful molecular procedures, *e.g.* SSRs, RAPDs, etc, are now being used for this purpose (Leblanc *et al., Detection of the apomictic mode of reproduction in maize-Tripsacum hybrids using maize RFLP markers*, Theor Appl Genet 90: 1198-1203, 1995; J. G. Carman & S. L. Hatch, *Aposporous Apomixis in Schizachyrium. Poaceae: Andropogoneae*,

22 Crop Sci. 1252-55 (1982); C. F. Crane & J. G. Carman, 74 Amer. J. Bot. 477-96 (1987) and Asker SE, L Jerling, 1992, *Apomixis in Plants*, CRC Press, Boca Raton, FL. Procedures for obtaining accurate estimates are commonly understood by those currently working in the field (Asker SE, L Jerling, 1992, Apomixis in plants, CRC Press, Boca Raton, FL).

Production of apomictic plants from sexual plants sometimes involves manipulating quantitative traits, but this does not make the process unpredictable. Respectfully, it should be pointed out that breeding for quantitative traits is a predictable process involving heritability estimates and has been a highly successful enterprise for over 100 years with both plants and animals. Examples of quantitative traits successfully manipulated in plants include yield, seed size, seed color, leaf widths and lengths, photosynthetic efficiencies, time to flowering, and photoperiodism all of which have been substantially improved or manipulated by plant breeding. Examples of quantitative traits successfully manipulated in animals include animal weights, egg size and color, milk production, hair color, and running speed and endurance of horses, all of which have been substantially improved or modified through animal breeding.

In this respect, the domestication and major geographic expansion of many crops, including sorghum, corn, wheat and rice, have relied on the predictable manipulation of photoperiodism (see Poehlman, JM, 1987, *Breeding Field Crops*, Van Nostrand Reinhold, New York). The approach taken in the instant specification is to identify (or create through breeding, etc) pairs of sexual parent lines that differ in specific sexual reproduction traits such that when the divergent sexual parents are hybridized they produce apomictic progeny. These traits can be readily modified through standard quantitative trait breeding procedures.

With respect to the predictability of chromosome doubling as raised by the Examiner, the chromosome numbers of hybrids can be doubled using standard colchicine techniques, e.g. J. Torabinejad et al., Morphology and Genome Analyses of Interspecific Hybrids of Elymus scabrus, 29 Genome 150-55 (1987), which have been predictably used for years in the art. Alternatively, tissue culture techniques may be used, *e.g.* O. Leblanc et al., Chromosome Doubling in Tripsacum: the Production of Artificial, Sexual Tetraploid Plants, 114 Plant Breed. 226-30 (1995); Salon & Earle, Determination of Mode of Reproduction of Synthetic Tetraploids of Eastern Gamagrass, Agron. Abs. Pg 114 (1994); Cohen & Yao, In Vitro Chromosome Doubling of Nine Zantedeschia Cultivars, 47 Plant Cell, Tiss. Org. Cult. 43-49 (1996); and Chalak & Legave, Oryzalin Combined with Adventitious Regeneration for an Efficient Chromosome Doubling of Trihaploid Kiwifruit, 16 Plant Cell Rep. 97-100

(1996). As is evidenced by the above references, chromosome doubling is a well known and predictable procedure that may require some routine experimentation, but definitely no "undue" experimentation would be necessary or required.

As stated above, the procedures used in Applicants presently claimed invention are well known in the art. The techniques have been used for years and while some are tedious and require multiple applications at time, they are proven and predictable techniques used by skilled plant breeders.

As further evidence of the predictability of Applicants invention, Applicant submits herewith a 1.132 Declaration that shows that three successes were obtained in three attempts at producing apomictic hybrids in *Antennaria, Sorghum* and *Tripsacum* using the methods as taught by Applicant's disclosure.

(F) Amount of Direction Provided by the Inventor

The present disclosure provides significant direction to one skilled in the art. The specification provides sufficient teachings and examples that one reasonably skilled in the art of plant hybridization would be enabled to produce a facultative apomictic plant and increase the genetic stability for apomixis of the plant produced without undue experimentation. First, Applicant provides significant teachings and examples of how to produce an apomictic parent plant as claimed.

Applicant's original disclosure teaches and provides examples of the presently claimed invention. For example, in Figures 2-5 and Example 1 of the disclosure, Applicant teaches and describes the step of producing a facultatively apomictic parent plant from sexual plants as claimed. In addition, Applicant fully disclosed and taught this step in the parent application U.S. Application No. 09/576,623, filed May 23, 2000, which has now issued as U.S. Patent No. 6,750,376 and is expressly incorporated by reference. Specifically, the disclosure sets forth Applicant's method of identifying and hybridizing sexual plants having divergent reproductive schedules of ovule development in order to produce facultatively apomictic plants. The disclosure more specifically teaches that the divergent reproductive schedules of ovule development between the plants should be such that initiation of embryo sac formation in one sexual plant should occur at about the same time as or before meiosis in the other sexual plant relative to the developmental maturity of the nongametophytic ovule and ovary tissues. Applicant further teaches that the nongametophytic ovule and ovary tissue should be selected from the group consisting of nucellus, integument, pericarp, hypanthium, and pistil wall.

In Example 5, Applicant provides an example of how to quantify divergence in female development schedules, and further in Example 6 Applicant discloses how to obtain greater divergence in female developmental schedules. See also Examples 7-9 and all Examples in the priority application – U.S. Patent No. 6,750,376.

As mentioned above, the 1.132 Declaration submitted herein shows the successful production of apomictic hybrids in *Antennaria*, *Sorghum*, and *Tripsacum* using the disclosed method, thus providing further evidence as to the enabling disclosure.

Second, Applicant further teaches and provides examples of the step of increasing the genetic stability for apomixis of the facultatively apomictic parent plant produced in the first step. See paragraphs [0089-108] and Example 2. Stabilizing apomixis refers to minimizing the occurrence of sexual revertants from the facultatively apomictic parent plant. Facultative apomicts, by name are genetically unstable, meaning they produce sexual segregants as a result of facultative sexual reproduction. Applicant provides several methods by which the genetic stability for apomixis can be increased in the facultative apomict. Applicant teaches that this can be done by either making the plant an obligate apomict (preventing sexual reproduction) or by minimizing segregation of the genes causing apomixis (*e.g.*, doubling the chromosome number).

In contrast to the prior art, Applicant first discovered and taught that apomixis is not caused by one or two apomixis genes, but in fact is caused by the asynchronous expression of many duplicate genes regulating meiosis and seed development. Based on this Applicant's discovery, he further discloses that based on this, the genetic stability for apomixis can be increased by doubling the chromosome number (*e.g.*, using spindle inhibitors, tissue culture, B_{III} hybridization, and the like), or by preventing sexual reproduction (*e.g.*, causing sexual sterility by the making of polyploids with odd ploidy levels, or introgressing meiotic mutations, *etc.*). The written description makes reasonably clear and provides examples of how standard methods of plant breeding can be used to double the chromosome numbers or otherwise manipulate ploidy levels of the parent plant to increase the stability for apomixis.

In Example 2, at paragraphs [0114-0118], Applicant provides a working example of successfully increasing the genetic stability for apomixis in a facultative apomict. The synthetic amphiploid of diploid *Tripsacum laxum* (2x sexual) x *T. pilosum* (2x sexual) is a stable facultative apomict with 50% diplosporous embryo sac formation (FIG. 8). By hybridizing this plant with *T. zopilotense* (2x sexual) or *T. bravum* (2x sexual), a stable

obligate apomict with about 80% diplosporous embryo sac formation and 20% abortive meiocyte or sexual embryo sac formation is produced (FIG. 9).

The application contains a thorough explanation of how the present duplicate-gene asynchrony approach to making apomictic plants is consistent with the observations that have been made in the apomixis field over many years and further explains why the theories and assumption of the prior art are deficient. Once it is understood by a person skilled in the art of plant breeding how apomixis arises, it is a routine matter to produce polyploids by chromosome doubling or B_{III} hybridization, for example, such that genetic segregation is suppressed.

(G) Existence of Working Examples

In Example 2, at paragraphs [0114-0118], Applicant provides a working example of successfully increasing the genetic stability for apomixis in a facultative apomict. The synthetic amphiploid of diploid Tripsacum laxum (2x sexual) x T. pilosum (2x sexual) is a stable facultative apomict with 50% diplosporous embryo sac formation (FIG. 8). By hybridizing this plant with T. zopilotense (2x sexual) or T. bravum (2x sexual) a stable obligate apomicts with about 80% diplosporous embryo sac formation and 20% abortive meiocyte or sexual embryo sac formation is produced (FIG. 9). Since this plant fails to produce seed sexually (sexual seed abortion conferred through odd ploidy), it is genetically stable. Also see the priority application – U.S. Patent No. 6,750,376 (FIGS. 3 and 4; Example 3and Example 5).

Further, additional examples were provided in the Declaration of John G. Carman under 37 C.F.R. §1.132 declaration. In this Declaration, Dr. Carman disclosed that facultative apomixis was obtained in both dicotyledonous (*Antennaria)* and monocotyledonous (*Sorghum* and *Tripsacum*) plants using the methods described.

(H) Quantity of Experimentation Needed

Based on the guidance and teaching provided in the specification and also based on the examples provided, any experimentation necessary for one skilled in the art to use the presently claimed method would be merely routine.

Based on the analysis of the factors above, the great preponderance of the evidence weighs in favor of an enabling disclosure. While some experimentation may be necessary to use the method as presently claimed, the experimentation would not be "undue" experimentation. For these reasons, it is respectfully requested that this rejection be withdrawn.

Claims 11-12, 19-20, and 37-38 were rejected under 35 USC 102(b) as being anticipated by Lutts *et al.* (Euphytica 78: 19-25 (1994)) for the reasons set forth on page 14 of the Office Action. Applicant has cancelled claims 11-12, 19-20, and 37-38 in an effort to expedite the allowance of this application. Applicant reserves the rights to pursue these claims in one or more continuation application without prejudice. In view of the cancellation of the claims this rejection is now moot. Therefore, Applicant requests that the rejection be withdrawn.

Claims 1-10, 13-18, 29-36 were rejected under 35 USC §102(b) as anticipated by or, in the alternative, under 35 USC §103(a) as being obvious over Lutts *et al.* (Euphytica 78: 19-25 (1994)) for the reasons set forth on pages 15-16. Applicant traverses.

Lutts is directed to research related to the transfer of genes for apomictic reproduction from an apomictic species to a sexual species. The method of Lutts requires the hybridization of a known apomictic species to a sexual species.

In contrast, Applicant's invention is directed to the production and stabilization of apomictic hybrids. Applicant's presently claimed invention requires the step of identifying sexual plants from an angiospermous plant species, genus, or family having divergent reproductive schedules of ovule development, followed by the step of hybridizing these identified sexual plants to produce an apomictic hybrid parent plant. Unlike Lutts, which teaches hybridization of two known apomictic species, Applicant surprisingly discovered that one must identify and hybridize plants that have divergent reproductive schedules of ovule development in order to produce an apomictic hybrid parent plant.

In addition, Lutts does not teach or suggest increasing the genetic stability of the apomictic plant after it is produced. Applicant's invention as set forth in claim 1 requires the step of doubling of the chromosome number of the apomictic hybrid plant produced. Lutts does not teach this step or suggest that such a step is necessary to stabilize the facultative apomictic plant produced. Also, Applicant's invention as set forth in independent claim 13 requires the step of genetically modifying the apomictic hybrid plant so that female meiosis is aborted, thereby increasing the genetic stability of the hybrid plant for apomixis. Again, Lutts does not teach or suggest the Applicant's method of producing an apomictic plant by identifying sexual plants from an angiospermous plant species, genus, or family having divergent reproductive schedules of ovule development, followed by the step of hybridizing these identified sexual plants. Lutts also does not teach the step of stabilizing the apomictic plant after it is produced.

It is evident from reading Lutts that they were not aware of the need of identifying and hybridizing plants having divergent reproductive schedules of ovule development. It was Applicant that first discovered and taught the importance of this step to produce a facultatively apomictic plant. In addition, it was Applicant that first taught and suggested the need to double the chromosomes, or genetically modify, the newly produced apomictic hybrid plant in order to increase the genetic stability of the hybrid plant for apomixis.

As Lutts fails to teach or even suggest each step of Applicant's method, it cannot anticipate or make obvious Applicant's presently claimed invention. Therefore, Applicant respectfully requests that this rejection be withdrawn.

In view of the above amendments and arguments, Applicant now believes all claims to be in condition for allowance. If there are any questions, the Examiner is invited to call Applicant's representative Rodney Fuller at (602) 916-5404 to resolve any remaining issues to expedite the allowance of this application.

Respectfully submitted,

Date: December 23, 2005

Rodney J. Fuller Reg. No. 46,714

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Certificate of Mailing under 37 C.F.R. § 1.8

I hereby certify that this paper and all documents and any fee referred to herein are being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Rebecca Camelio

Rebecca Camelio

December 23, 2005
Date of Signature